

COMMONWEALTH OF VIRGINIA
FAIRFAX COUNTY

BOARD OF SUPERVISORS
Fairfax, Virginia 22035

August 20, 2004

SUPERVISOR LINDA Q. SMYTH

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Ms. Sarah L. King, Grants Manager
Department of Conservation and Recreation
Division of Soil and Water Conservation
203 Governor Street, Suite 206-G
Richmond, Virginia 23219-2094

Dear Ms. King:

The Providence District Supervisor's Office, Fairfax County Board of Supervisors is pleased to submit the enclosed grant application for a LID Based Stormwater Management Retrofit Demonstration Project at our office site.

We propose to install three LID practices: a rain garden/bioretenention area, green roof, and permeable pavers. The rain garden will be one of the first in Fairfax County to serve as a detention rain garden. This highly visible demonstration project will not only be helpful to County staff, but also to developers, land use planners and citizens of our district, Fairfax County and surrounding jurisdictions.

LID concepts will play a key role in new development in Fairfax County. Perhaps more importantly, though, re-development and retrofitting of sites with innovative LID practices will become increasingly more common and more important. We are pleased to partner with County agencies and the Northern Virginia Soil and Water Conservation District in this effort.

We believe that a combination of the considerable expertise within the project team, the strong support of County agencies and a well-suited, self-contained and highly visible site will produce an excellent demonstration of an LID based stormwater management retrofit. We hope you will look favorably upon our request.

Sincerely,

Linda Q. Smyth
Providence District Supervisor

Attachments

Demonstrating Innovation A Stormwater Retrofit at the Providence Supervisor's Office

SUMMARY

The Providence Supervisor's Office (Fairfax County Board of Supervisors) is housed in Fire Station 30 (Merrifield Fire Station)¹. The site is located within the Accotink Creek watershed and the entire site is self-contained. The building and parking lot were built in 1977 and encompass a land area of 1.8 acres with 1.44 acres being impervious in nature. For this project, 1.2 acres are under the project scope and 0.96 acres are impervious in nature.

Fairfax County staff began working on an evaluation of Green Roof technology in September 2003. Recently, a work group report was submitted to the Board of Supervisors and serves as the catalyst for this project.² While the report focused primarily on Green Roof technology, other Low Impact Development (LID) practices were highlighted and the feasibility of integrating these methods into County practice was offered.

This project will serve as a highly visible demonstration project for three Low Impact Development/Best Management Practices: a rain garden/biofiltration area, permeable pavers and a green roof. The three proposed techniques presented as part of this grant are only a portion of an overall conceptual site plan that ideally will be implemented.³ One of the highlights of this project is that a conceptual system for the whole subject site has been developed. In this application, three projects of what can be *done now* are offered.

In designing the innovative stormwater retrofit devices for this project, careful attention has been paid to ensuring that both water quality and water quantity are addressed. Thus, the proposed combined and integrated system was designed so all three devices work together in improving water quality and reducing water quantity.

The rain garden/biofiltration area⁴ in this project will be the first rain garden designed for detention purposes in Fairfax County. Thus, the successful completion of this rain garden will allow for possible modifications/changes to the Public Facilities Manual (PFM)⁵ in the future and create tangible and policy-related deliverables. The soil type for the project site is Glenelg and is one of the permeable soils in Fairfax County. Given that, and it is important to note that the project site is on a pocket of permeable soil and thus, the bioretention facility can operate almost totally using infiltration and does not even need a "drain." In this way, we will be able to achieve the 6 foot depth which would not be possible if the soil were of a different type. Further, the "drain" will function as a sampling point. Unfortunately, there are many places in Fairfax County that do not allow infiltration - this project site is one place that would work well for such an effort.

The green roof installation on a concrete shed will serve two functions: reduction of rooftop runoff and a comparison to the adjacent shed with an impervious roof. As noted above, the green roof

¹ For more information on the site location, visit <http://www.fairfaxcounty.gov/gov/bos/pd/directions.htm> and see the map at the bottom of the web page.

² See Appendix A for a copy of the report to the Board of Supervisors from the County Executive.

³ See Appendix B for a map of the conceptual site plan.

⁴ See Appendix D for a sample rain garden/biofiltration area diagram to be used for this project.

⁵ The Public Facilities Manual is available for online viewing or downloading at: http://www.fairfaxcounty.gov/dpwes/publications/pfm/pfm_main.htm.

will also allow for demonstration efforts and education-related materials to the residents, businesses and governmental bodies in and around Fairfax County.

All of the LID-based stormwater retrofits in this project are in accord with the County's 2000 amendment to its Policy Plan that encourages the use of LID concepts and techniques. This can be an attractive incentive for developers to incorporate LID concepts into development and re-development projects in Northern Virginia. The project site is frequently visited by developers, land use planners and other professionals; thus, having in/on-the-ground examples of LIDs/BMPs will offer "real" and demonstrable examples of the practices encouraged by the County.

Of the 10,990 sq. ft. of conceptual site modifications, this project will modify 3,308 sq. ft. or approximately 30% of the site. This significant level of modification is important in the Fairfax County/Tyson's Corner/Vienna area, as there is considerable redevelopment potential in and around the project site. Demonstration of retrofit practices is especially important in an area of the county that is 85% developed. Also, stormwater runoff will be reduced by 50% - from 10,454 ft³ to 5,254 ft³.

SCOPE OF WORK

1. Project Activities

- a. Design of three LID/BMP devices for installation at the subject site. In preparation for this installation, a project team will be assembled to address all relevant concerns and potential problems since such a project has not occurred at a Fairfax County site before. The three devices for this phase of the project include a rain garden/bioretenention area (1,405 sq. ft.), a green roof (240 sq. ft.) and installation of permeable pavers (1,527 sq. ft.).
- b. Development of educational materials that can be used to raise community and developer awareness about the benefits of retrofitting LID concepts on development sites, as well as in new development. Such materials will include a brochure, newsletter article (with distribution of 40,000 or more), web site (sub-site of the Supervisor's web site with 20,000 hits per month) and signage on the property.
- c. Formation of an integration plan for including the project into existing community/education events. Primarily, the Providence District Environmental Workshop, hosted annually by the Supervisor, will allow for full exposure of the project and its related educational materials to this audience. The Workshop is held each spring and 2005 will mark the 6th annual event.
- d. Development of a plan to monitor the performance of the LID techniques implemented at the project site. In partnership with the County Department of Public Works and Environmental Services (DPWES), the site will be added to the list of monitoring sites already visited by county staff.
- e. Production of a report on the challenges and positive aspects of completing an innovative stormwater retrofit project at a Fairfax County-owned site. Throughout the process, questions on permits, PFM challenges, partnership opportunities and logistical challenges might arise and a report of these items will be helpful for future efforts in this area.

2. Cooperating Organizations

Three public agencies – consisting of seven individual units – are cooperating in this project:

Fairfax County Board of Supervisors Providence District Office – The Providence District Supervisor’s Office will administer and lead the Project. The Office will be responsible for educational materials, public outreach and will assist in monitoring efforts.

Fairfax County Department of Public Works and Environmental Services – The Fairfax County Department of Public Works and Environmental Services (DPWES) will provide key support in the construction and engineering efforts associated with the rain garden/bioretention area and permeable pavers. The Stormwater Planning Division (SPD) will assist with design and installation efforts and monitoring of the site; the Land Development Services (LDS) office will provide support for permits, site design and offer assistance in pre-construction efforts; the Maintenance and Stormwater Management Division (MSMD) will provide installation support; and the Facilities Management Division (FMD) will be involved in each step of the project, as the site is owned and maintained by that Division.

Northern Virginia Soil and Water Conservation District – The Northern Virginia Soil and Water Conservation District (NVSWCD) will provide key engineering support in preparing the final design, assistance with installation efforts, and will assist in the formation of partnerships for the project. Further, the District will assist with outreach materials and newsletter article submissions.

3. Staffing and Administration

Administrative Staff

Project Manager – Michael Aho: Mr. Aho, an aide to the Providence District Supervisor, is responsible for areas related to parks, public works, watershed management, transportation, technology, public relations and other key matters related to County policy and County agencies. He has completed the “Master Watershed Steward” program through the Potomac River Greenways Coalition, has completed the Environmental Protection Agency’s *Watershed Academy Web-based Training Program* and has been involved with three of the County’s watershed planning efforts (Little Hunting Creek, Cameron Run and Difficult Run).

Carl Bouchard: Mr. Bouchard is the Director of the Stormwater Planning Division in DPWES. He is responsible for oversight of the County’s watershed planning process and also works on stormwater and watershed issues on a daily basis. Mr. Bouchard will be responsible for coordinating the services of DPWES related to this project. He holds a P.E. license in Virginia.

Diane Hoffman: Ms. Hoffman, the NVSWCD Administrator, is responsible for overall program administration and handles policy, budget, and watershed issues. She administered the Kingstowne Stream Restoration Project and co-chairs the county committee to examine and recommend improvements in stormwater management. She will assist in the administration of this project.

Technical Project Staff

Dr. Asad Rouhi: Dr. Rouhi is a conservation engineer with the NVSWCD. He has worked with DPWES to promote the use of innovative stormwater management concepts such as LID. He

designed and installed (assisted by DPWES-MSMD equipment operators) a rain garden at the Yorktowne Square Condominium site in Providence District.

Ron Tuttle: Mr. Tuttle is a landscape architect with the Stormwater Planning Division in DPWES. He is highly involved in the introduction and integration of LID, stream restoration, and other emerging stormwater technologies in Fairfax County. He and Dr. Rouhi have collaborated on numerous projects including the rain garden at the Yorktowne Square Condominium site.

Kathryn Moore: Ms. Moore is a design/construction engineer with MSMD in DPWES. She has over 25 years of experience in the water/wastewater field, most of which involved redevelopment/retrofitting of existing facilities for enhanced functionality. She holds a P.E. license in Virginia.

Russ Smith: Mr. Smith is a Watershed Resource Engineer with the Stormwater Planning Division in DPWES. He is the project engineer for the County's VPDES MS-4 Stormwater permit with the State and has been involved with in the integration of environmental friendly stormwater management system into the stormwater infrastructure of the County for the past 6 years. He and Mr. Tuttle have collaborated in review of Rezoning Applications in an effort to encourage developers to use LID and Better Site Design at project inception.

4. Products and Outcomes

The products that will result from this project are:

- 1) Design (including Plans and Specifications) for implementing LID concepts and technologies at the Providence Supervisor's Office/Fire Station 30;
- 2) Implementation of three technologies identified in the Design;
- 3) Public information materials including pamphlets, handouts, web site material and newsletter submission(s);
- 4) Publication of a report on the challenges and benefits of stormwater retrofitting at a County facility;
- 5) A program component of the annual Providence District Environmental Workshop, consisting of educational materials, visual aids and other materials;
- 6) A monitoring program to measure NPS and pollutants from the site.

The outcomes that will result from this project are:

- 1) LID concepts and technologies will be demonstrated in a manner that will promote implementation of LID concepts throughout the County, and in other areas of Virginia at both public and private sites;
- 2) Increased awareness and public knowledge of LID/BMPs and the steps necessary to retrofit a site with these concepts;
- 3) A long-term conceptual plan that will allow for future site modifications and monitoring efforts;
- 4) Awareness of fire station-related pollutants and the possibilities of lessening their negative impacts through implementation of LID/BMPs.

Demonstrating Innovation
A Stormwater Retrofit at the Providence Supervisor's Office

BUDGET NARRATIVE

A spreadsheet, titled: "Appendix_C.xls," is provided with this grant proposal and serves as a supplement to Attachment B. It provides the basis for our cost calculations. The spreadsheet provides cost information by task and by project. The following narrative provides summary information, and is to be considered in concert with the information provided in the spreadsheet.

It should be noted that, while Fairfax County has many resources, few are dedicated to stormwater management and even fewer to retrofit projects. The monies being requested as part of this grant will serve as a catalyst to other Agencies in the County to seek similar funds or to designate budget items for LID purposes.

Personnel:

Total project staff will spend 600 hours on the three elements of this project and its associated components. This time includes, but is not limited to, design, meetings, plan approval, inspection, supervision, and the design of public relations materials. All personnel time for this project is part of the matching element of this grant application.

The Providence District Supervisor's Office will administer and lead the Project. The Office will be responsible for educational materials, public outreach and will assist in monitoring efforts. As part of this effort, 350 hours will be spent on fulfilling grant obligations.

The Fairfax County Department of Public Works and Environmental Services (DPWES) will provide key support in the construction and engineering efforts associated with the rain garden/bioretenion area and permeable pavers. The Stormwater Planning Division (SPD) will assist with design and monitoring efforts and monitoring of the site. The Land Development Services (LDS) office will provide support for permits, site design and offer assistance in pre-construction efforts. The Maintenance and Stormwater Management Division (MSMD) will provide installation support. The Facilities Management Division (FMD) will be involved in each step of the project, as the site is owned and maintained by that Division. The Northern Virginia Soil and Water Conservation District (NVSWCD) will provide key engineering support in preparing the final design, assistance with installation efforts, and will assist in the formation of partnerships for the project. Further, the District will assist with outreach materials and newsletter article submissions. The combined total of DPWES and NVSWCD personnel efforts will encompass 250 hours fulfilling grant obligations.

Fringe Benefits:

Primary project participants are calculated with a 16.8% fringe benefit rate⁶. This includes health insurance, long-term care insurance (where applicable), deferred compensation, and retirement (where applicable).

Travel:

Travel has been calculated according to Virginia State Travel Regulations. The grant proposal includes only visits to and from the project site and is local in nature.

Equipment:

\$8,000:	One backhoe, one front loader for the rain garden/bioretention area
\$5,934:	Equipment associated with the installation of permeable pavers

Supplies:

Supplies for this project include the following:

\$3,000:	Signage and related installation for LID practices in parking lot
\$1,500:	Signage for Environmental Workshop display, traveling display and carry-and-go demonstrations of the project
\$4,500:	Materials for printing and distributing the brochures, educational materials, and the developer/land use public relations materials (includes printing cost, paper/ink supplies, and similar items)
\$4,500:	Planting soil, Mulch, filter material (gravel etc.) (for the rain garden/bioretention area)
\$1,600:	Plants, under drains (for the rain garden/bioretention area)
\$11,000:	Permeable pavers, crushed stone base, geotextile fabric and edging (for completion of the permeable paver project) – <i>Note: the applicant will seek a partnership with a permeable paver manufacturer to obtain a reduced rate for the pavers.</i>
\$7,000:	Green roof materials necessary for project completion (membrane, dowels, copings, etc.)

Contractual:

Contractual costs are minimal for the purposes of this grant and are delineated on the Appendix C.

Construction:

⁶ <http://www.fairfaxcounty.gov/gov/omb/pdf/overview/37%5Fsum%5Femp%5Fbenefits.pdf>

Construction will consist of the implementation of three LID technologies. The exact technologies include a green roof, installation of permeable pavers, and a rain garden/bioretenention area. Total construction costs equal \$21,400.

The installation and design of the green roof for this project will be in concert with Appendix G of the proposal and will expend \$4,400 in installation/assembly costs.

The site preparation and installation of the permeable paver project will cost approximately \$6,200. \$10,800 is allotted for construction costs related to the rain garden/bioretenention area.

Other Direct:

Because the project will disturb more than 2,500 sq. ft. of the site, permits will be necessary and the fees associated with them will be considered in-kind under the matching portion of the budget. \$600 in match funds has been allocated for the purpose of obtaining the requisite permits.

Indirect:

No indirect costs have been charged to the grant. We have estimated the direct charges that are associated with performing the work and have included these charges as part of our matching share.

Indirect charges include Overhead and General/Administrative costs for the governmental members of the grant team. The rate used was 40% of the personnel cost plus total fringe benefits.

FAIRFAX COUNTY, VIRGINIA**MEMORANDUM**

TO: BOARD OF SUPERVISORS **DATE:** Forthcoming

FROM: Anthony H. Griffin
County Executive

SUBJECT: Board Date – September 29, 2003, 2b
Evaluation of Green Roof Technology - Final Response

During its meeting on September 29, 2003, the Board of Supervisors requested that staff prepare an evaluation of Green Roof technology and report on whether it can be employed cost effectively in Fairfax County. Staff from the Department of Public Works and Environmental Services (DPWES) was designated the lead agency to formulate a multi-agency work group to explore this issue and develop recommendations to be presented to the Board for consideration. An interim response was provided to the Board in late fall 2003, after the formation of the work group and initial meetings.

BACKGROUND:

The work group consists of representatives from the following agencies and organizations:

- Facilities Management Division (FMD) – DPWES
- Land Development Services (LDS) – DPWES
- Planning and Design Division (PDD) – DPWES
- Maintenance and Stormwater Management Division (MSMD) – DPWES
- Stormwater Planning Division (SWPD) – DPWES
- Housing and Community Development (HCD)
- Department of Planning and Zoning (DPZ)
- Fairfax County Park Authority (FCPA)
- Fairfax County Public Schools (FCPS)
- The Environmental Coordinator

The work group prepared a tentative scope of work and schedule for this final report; the scope of work involved extensive research of green roof technology and its application in the region, nation, and internationally. The work group, being from different agencies with diverse interests and experiences, recognized the need to strive for final recommendations through a consensus-building process that took into consideration each individual's input and experience. In addition to the research, the consensus-building process involved several meetings since fall 2003, a visit from a neighboring jurisdiction (Arlington County), attendance at seminars/ workshops, and finally this report.

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The overriding goal of the group's effort was defined as conducting:

- a. An evaluation of green roof technology.
- b. A report on how it can be used in the County.
- c. An investigation of potential for cost savings/increases.
- d. A determination of positive environmental attributes for County and other facilities.

In order to support the above goal, a more detailed description of the research and findings is outlined in **Attachment 1**.

RECOMMENDATION:

The general consensus of the group is that green roofs can play an integral role as part of the larger Leadership in Energy and Environmental Design (LEED) Green Building approach to building project development. They should also be considered an integral part of the Low Impact Development (LID) suite of measures designed to control stormwater quantity and quality closer to the source. The overall benefits are that green roofs can help to save energy usage in buildings, reduce the heat island effect, serve as an aesthetic amenity, and mitigate the negative impacts of impervious area on the health of receiving streams, 70% of which are in fair to very poor conditions. The general recommendation is that green roofs should be examined in the broader context of the LEED Green Building design approach that is becoming a nation-wide trend as part of the LEED certification program, which has been adopted by Arlington County. Fairfax County has already initiated the LEED development approach on several facilities. It is believed that the County could adopt green roofs as part of LEED first on a small scale, limited risk demonstration basis involving projects/sites of publicly owned buildings, and then encourage commercial developers to do the same with or without incentives.

County demonstration projects would give agencies familiarity and experience with the latest nuances with the technology, maintenance procedures and cost impacts, while offering leadership for private industry. Demonstration projects could also serve to increase the comfort level of staff members who are aware of unsatisfactory results with green roofs installed on County facilities during the seventies and eighties, including the Cooperative Computer Center, One University Drive, and Terra Centre Elementary School. Most problems with older green roofs concerned leaking of the waterproof membrane, which can deteriorate over time and cause the integrity of the roof system to fail. These older roof systems sometimes came with inadequate manufacturer's warranties and leaks sometimes lead to mold growth. Improvements have been made to the quality of waterproof membranes of modern green roofs; if properly installed, these roofs are believed to be capable of outlasting a conventional roof by three times based on experiences with roofs in Europe and the U.S. Implementation of green roof demonstration projects will involve detailed evaluations of the following: a) existing buildings to determine if the structural framework and supporting systems can accommodate a green roof; b) if new buildings in the pipeline can have their designs modified to accommodate a green roof; and c) identify a source of funding to absorb the additional initial capital cost for installing a green roof instead of a conventional roof. Staff in DPWES will continue to coordinate with stakeholder agencies such as Fairfax County Public Schools, Park Authority, HCD, and others in this regard.

The broader application of green roofs Countywide may involve adoption into the County's Code and/or Comprehensive Plan to encourage green roofs by industry/developers where feasible. Unless otherwise directed, staff will develop specific recommendations of changes to the County's Code and/or Comprehensive Plan to encourage the use of green roofs as part of an overall LEED certification process and as a stand alone measure for stormwater management.

Attachments: As Stated

cc: Robert A. Stalzer, Deputy County Executive

Jimmie D. Jenkins, Acting Director, Department of Public Works and Environmental Services

Carl E. Bouchard, Director, Stormwater Planning Division, DPWES

ATTACHMENT 1

Detailed Report on Green Roofs

Design and Materials

There are two types of green roofs: intensive and extensive. Intensive roofs require a minimum of one foot of soil depth.⁽¹⁾ These are manicured rooftop gardens with trees, shrubs, and flower beds that require routine maintenance. Intensive green roofs are designed first with aesthetics and use in mind and secondarily for environmental benefits. Extensive green roofs can have a soil depth of as little as one inch and are infrequently accessed for maintenance.⁽¹⁾ These roofs are designed primarily for their environmental benefits and are not intended for regular public access.

Extensive green roofs consist of waterproof membrane, growth media and plants. The waterproofing material is typically either Polyvinyl Chloride (PVC) or Ethylene Propylene Diene Monomer (EPDM). There is a soil layer placed on top. The type of soil depends on the load capacity of the roof. The last layer is the plant materials. Typically the plants are shallow-rooted succulents or those that have adapted to withstand harsh conditions.⁽¹⁾

There are a variety of designs of extensive green roofs; the type of design chosen depends on the load capacity of the roof. The simplest design is just a waterproofing membrane, media, and plants. Other designs include a drainage system, filter membrane, thermal insulation layer, root barrier or wind erosion fabric in addition to the media and plants.⁽¹⁾

Green roofs can be installed on a variety of roofs. They can be easily installed on roofs with a slope between five and 20 degrees. Roofs with up to a 40 degree slope can also be greened but any slope over 20 degrees or less than five degrees requires additional costs. Roofs with a flatter slope require drainage systems whereas roofs with slopes of greater than 20 degrees require a wooden grid to keep the soil and plants in place.⁽¹⁾ Currently available technology addresses primarily flat roofs.⁽²⁾ Green roofs can be installed on a wide range of roof sizes. Ford recently put a green roof on their assembly building in Michigan that is 454,000 square feet in size.⁽⁵⁾ A 3,000 square foot green roof was recently installed on Arlington County's Government building. Larger installations typically drive the cost per square foot down.⁽²⁾

The minimum load capacity of a green roof is 15 pounds per square foot beyond snow load requirements. After that the type of media and plants dictates the load requirements up to 50 pounds per square foot.⁽¹⁾ Retrofitting is often difficult due to the poor load bearing capacity of most roofs.⁽²⁾ However, new facilities can be planned to allow for the proper load bearing capacity.⁽²⁾

Green roofs can initially cost twice that of a typical roof resurfacing, \$11-13 per square foot.⁽¹⁾ Retrofitting costs average \$15 per square foot, although retrofits can be expected to vary depending upon prevailing conditions.⁽³⁾ The applicability of green roofs is driven by the project economics. Strict stormwater requirements usually favor green roofs, as they may become cost competitive with other stormwater measures that may be necessary.⁽²⁾

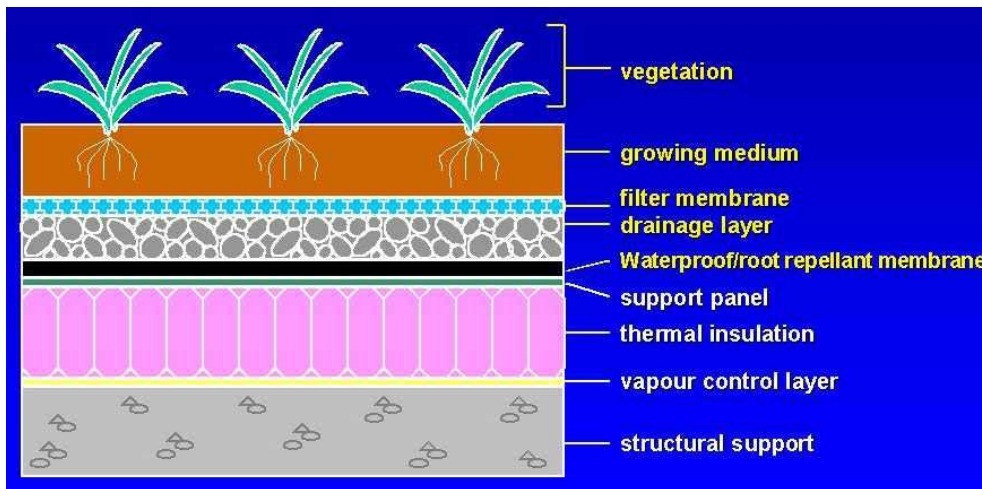


Figure 1: **Typical Green Roof Technology Components**

Source: National Research Council, Institute for Research in Construction

Maintenance

Maintenance on roof gardens is similar to horticultural operations for gardens at grade. The maintenance on extensive green roofs is minimal. Routine maintenance is required during the first 6 months of the life of a green roof. Every week the plants should be watered and weeded. After the first 6 months the plants should be established and the only maintenance required is the application of a slow release fertilizer every 6 months and watering of the plants if there is a severe drought.⁽¹⁾

Tom Lipton, Portland, Oregon Bureau of Environmental Services (BES) cited two case studies regarding maintenance. One is a private residence that is approximately 35 years old and has colonized into a “green roof” due to heavily-wooded site conditions. The homeowner has experienced no leaking through the original membrane (recently inspected) and only minor maintenance (weeding) to prevent invasive species and sustain the desired vegetative community. The second case study was installed on the roof (approximately 5% slope) of a fire station in 1996. They have had no problems at all with leaks through the membrane. He indicated an important facet of leak-free systems is proper installation and soil/plant cover to protect the membrane from damaging effects of the sun.

Service life/Warranty

Proper design, specifications, and construction should prevent leaking membranes from occurring. Many green roof manufacturers and installers offer water proofing warranty on green roof installations.⁽²⁾ Typically the waterproofing membrane comes with a 20 year warranty.⁽¹⁾ Depending on the manufacturer the warranty can range from 15 to 25 years.⁽²⁾ If properly installed a green roof can outlive a conventional roof by a factor of three times.⁽¹⁾ Europe has numerous green roof installations that are several decades old (25 years and older) and have not needed any major reconstruction.⁽²⁾ The Rockefeller Center in New York has a roof garden that was installed in the 1930's and is still in place.⁽²⁾ Green roofs are expected to have a service life of 30-40 years.⁽³⁾ A green roof recently installed in Oregon with funding from the Housing

Authority obtained a 30-year warranty on the membrane.⁽³⁾ Green roof materials (i.e. growing medium and drainage layer) are specified in a way that insures their proper longevity.

Specifications are based on the [Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau. e.V. \(FLL\)](#), in Germany (*Guidelines for Planning, Installation, and Maintenance of Green Roofs*, Richtlinien für die Planung, Ausführung und Pflege von Dachbegrünungen, Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau. e.V.), that offers the best long term track record.⁽²⁾

Generally speaking, green roofs are most suited to urban areas, or sites with severe spatial restrictions, where stormwater management at grade becomes very difficult and costly.⁽²⁾ Ideally a green roof would be installed in an area with high visibility, such as a library, school or other public facility, to increase awareness.⁽¹⁾

Benefits of Green Roofs

Green roofs provide a wide variety of benefits, from stormwater quantity reduction to aesthetics benefits:

- A four-inch thick green roof can retain up to a one-inch rainfall event, which is 95% of the storm events in this area.⁽⁵⁾ This reduction in the peak flows reduces the instream erosion, therefore maintaining instream habitat for aquatic life and reducing the sediment load to the Potomac, and eventually to the Chesapeake Bay.
- Green roofs filter particles out of the ambient air similar to trees along streets.⁽²⁾
- Nutrient reduction from rainwater on a green roof is currently being studied at Penn State.⁽¹⁾ Nutrient pollution from a green roof may occur only if improper or excessive fertilizer application takes place, or if improper materials are used.⁽²⁾
- Green roofs also help in reducing the heat island effect.⁽²⁾ Transpiration from the plants increases the humidity in the air causing the air to remain cooler.⁽¹⁾
- In general terms, the green roof acts as an insulating agent, particularly in the summer, due to its large volume of pore space.⁽²⁾ Returns on energy savings from a green roof can be seen within a few years for a one story building while a multistory building will take many years before returns are seen.⁽¹⁾
- An extensive roof of 200 m² produces enough oxygen for 3.6 people per year.
- A green roof with 8 inch layer of soil and vegetation can reduce sound by 46dB.⁽⁵⁾
- Green roofs also have a psychological benefit if the green roof can be seen. Green roofs are attractive features on a building and are aesthetically pleasing for the building's neighbors.⁽¹⁾
- Green roofs provide habitat for birds and butterflies.⁽¹⁾



Figure 2 – Green roof examples

There has been no evidence that mold is an issue with any green roof application.⁽¹⁾ Health detriments, if they occur, may be directly linked to improper installation.⁽²⁾ Tom Lipton, from the Portland BES, said they have had no adverse effects from molds or other detrimental conditions.⁽³⁾

Implementation Strategy

- a. Public - Identify a number of County facilities as candidates.
 - Explore opportunity with scheduled roof replacements.
 - Examine opportunity for application with new developments.
 - Other.
- b. Private – Incentives for developer.
 - Take advantage of grants (such as EPA 315).⁽²⁾
 - Incentives example – The City of Portland has instituted several incentives to encourage green roofs. They include:
 - (1) Increased allowable building density based upon documented environmental benefits;
 - (2) Full stormwater management credit for a building footprint with green roof [they are monitoring and have found green roofs to be very effective];
 - (3) Grant program (\$5,000 and up) to encourage LID including green roofs.⁽³⁾

- Leadership in Energy and Environmental Design (LEED). It is best if green roofs are incorporated with other LID practices on the site. The LEED program provides a framework for “greening” the entire building, and making it more environmentally friendly.⁽¹⁾
- LEED applicability/assessment example.⁽²⁾
 - Sustainable Sites
 - Credit 6.1 Stormwater Management
 - Credit 6.2 Stormwater Management
 - Credit 7.2 Heat Island Effect
 - Water Efficiency
 - Credit 1.1 Water Efficient Landscaping
 - Credit 1.2 Water Efficient Landscaping
 - Credit 3.1 Water Use Reduction
 - Credit 3.2 Water Use Reduction
 - Credits for Innovation and Design Process

Recommendations

- Follow LEED as an example.
- Install demonstration projects – 1 or 2 from Capital Facilities/Facilities Management Division, Fairfax County Public Schools, Park Authority, or Department of Housing and Community Development.
- Hold seminars for developers/building community, similar to Arlington County.
- Secure additional capital funding. Pursue grants through DCR and other sources.

Sources used for Research of the Technology

- a. Municipalities investigated:
 - Fairfax County, VA
 - Arlington County, VA
 - Portland, OR
 - Washington, DC
 - Atlanta, GA
 - Chicago, IL
- b. Testimonials:
 - Owner(s)/operator(s)/builder(s)
 - Jeanette Stewart, HOA President⁽⁷⁾
Yorketowne Square Condominiums
2905 Charing Cross Road
Falls Church, VA 22042

- Dave Alberts, AIA
Arlington County Department of Environmental Services
- Benjamin Taube⁽⁴⁾
Environmental Manager
City of Atlanta
55 Trinity Avenue SW, Suite 5900
Atlanta, GA 30303
- Tom Lipton⁽³⁾
Landscape Architect (Green Roof Specialist)
Bureau of Environmental Services
Portland, OR
- Vendors
 - Ed Snodgrass; Emory Knolls Farm in Maryland where he produces the plants grown on green roofs (www.greenroofplants.com).
(410) 452-5880
 - Michael Perry, AIA
Building Logics
3213 Virginia Beach Boulevard
Virginia Beach, VA 23452
(757) 431-3170
- Consultants
 - Katrin Scholz-Barth^{(1) & (5)}
Green Roofs * Grants * Lectures * Consulting
1246 Duncan Place NE
Washington, D.C. 20002 U.S.A.
(202).544-8453
Email: katrin@scholz-barth.com
 - Marcus de la fleur, MLA⁽²⁾
Conservation Design Forum
375 W. First Street
Elmhurst, IL 60126
 - Gregory Long, RLA
Bowman Consulting
2121 Eisenhower Avenue, Suite 302
Alexandria, VA 22314

1. Scholz-Barth, Katrin. Green Roofs: Stormwater Management from the Top Down. EnvironmentalDesign+Construction, Jan 2001.
2. Marcus de la fleur Dip.Hort.Kew / MLA, Associate, Conservation Design Forum, 375 W. First Street, Elmhurst, IL 60126 (personal communication)
3. Tom Lipton, Landscape Architect (Green Roof Specialist), Bureau of Environmental Services, Portland, OR (personal communication)
4. Benjamin Taube, Environmental Manager, City of Atlanta, 55 Trinity Ave. SW, Suite 5900 Atlanta, Georgia 30303 (personal communication)
5. Scholz-Barth, Katrin. Presentation: Green Roofs as Green Infrastructure. Given February 25, 2004 at the 13th Green Infrastructure Forum.
6. Johnson, Lorraine. The Green Fields of Ford: Will a pioneering, ultra-thin application work for the largest green roof in North America? Landscape Architecture, January 2004, pgs 16-23.
7. Jeanette Stewart. Yorktowne Square Condominiums. Personal communication.

Related Links:

- Roofscapes, vendor of Green Roofs, <http://www.roofscapes.com/>
- Arlington County Department of Environmental Services, Green Buildings, http://www.co.arlington.va.us/des/EPO/gb_arl.htm
- Green Roofs for Healthy Cities, <http://www.greenroofs.ca/grhcc/index.html>
- Greenroofs.com, <http://www.greenroofs.com/>
- Article : Green Roofs: Stormwater Management from the Top Down in EnvironmentalDesign+Construction, http://www.edcmag.com/edc/cda/articleinformation/features/bnp_features_item/0,,18769,00+en-uss_01dbc.html
- U.S. Green Building Council, Leadership in Energy and Environmental Design, <https://www.usgbc.org/Docs/LEEDdocs/LEEDfaq-materials2.pdf>

Providence Government Center

Stormwater Retrofit

Permeable Pavment

Area A - 2755 Sq. Ft.

Area B - 2817 Sq. Ft.

Area C - 1900 Sq. Ft.

Area D - 1527 Sq. Ft.

Green Roofs

Area E - 240 Sq. Ft.

Area F - 120 Sq. Ft.

Bioretention Area

Area G - 1405 Sq. Ft.

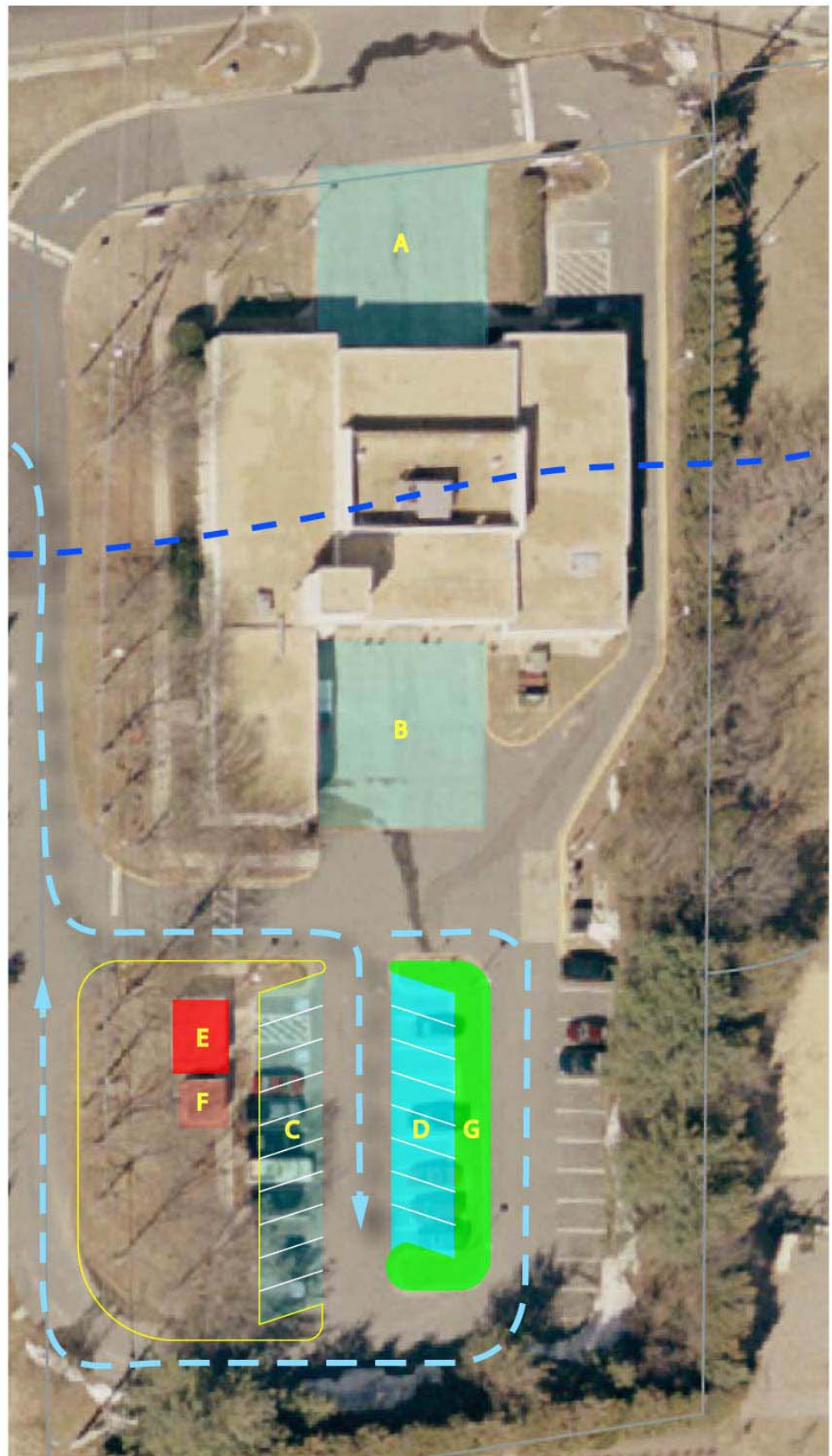
Non-Emergency
Circulation

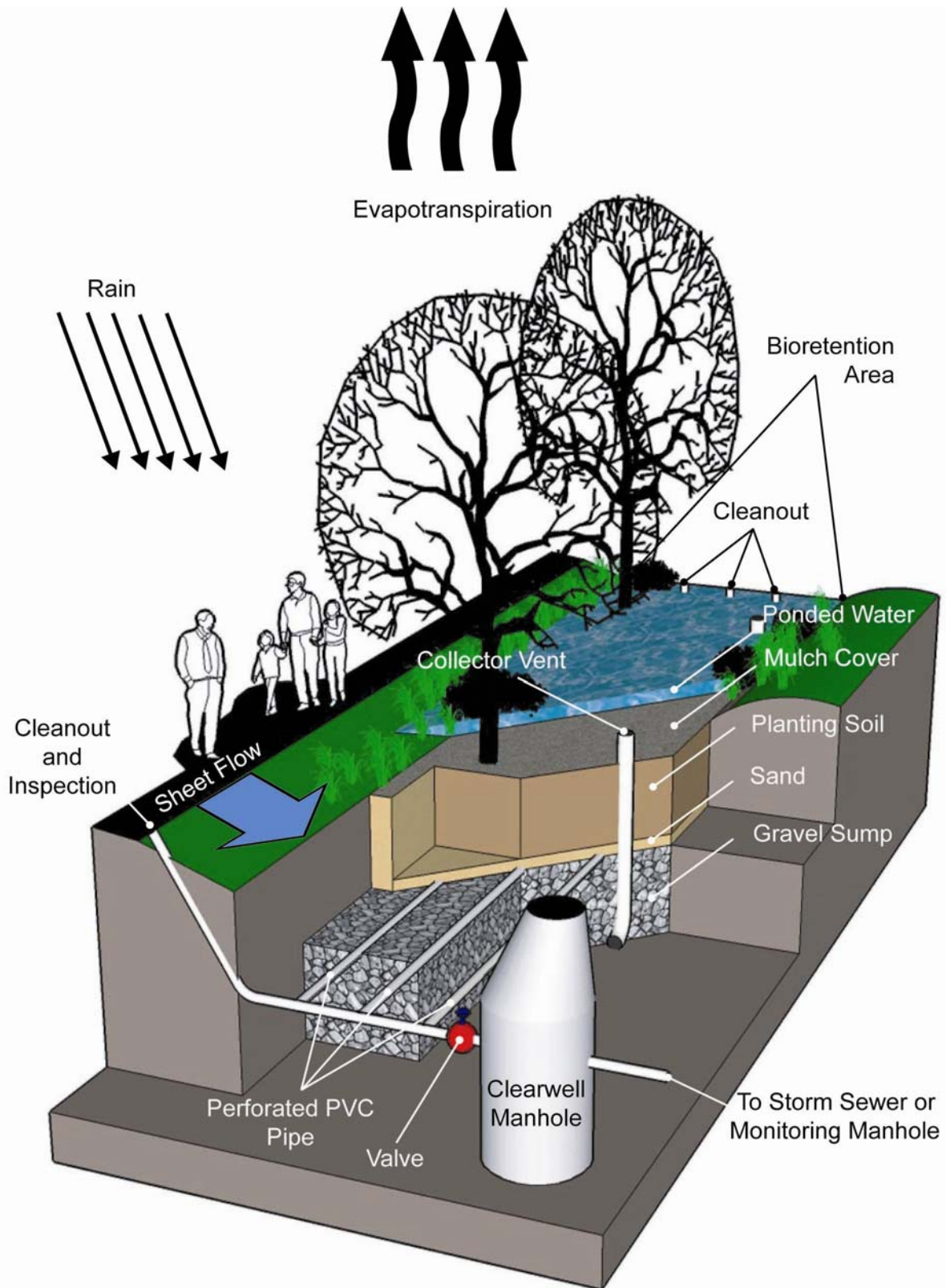
Sub-watershed
Boundary

Note:

Areas Designated with
Bold Highlighting are
Currently Proposed.

Remaining Highlighted
Areas for Future Consider-
ation





Bioretention, Porous Pavers Pollutant Removal Efficiency

Using the existing available monitoring data to predict the bioretention performance is complicated. This is mainly due to the fact that monitoring data are not collected using similar methodology, similarly designed facilities of from facilities with quality in terms of construction and maintenance. *The following table presents a summary of monitoring data as well as recommended pollutant removal efficiencies for.....*

	TSS	TP	TN	TKN	NO3	Cu	Pb	Zn
Beltway Plaza Mall Parking Lot, Greenbelt, MD (Davis et.al.) (1)	-	65%	49%	52%	16%	>97 %	>95 %	>95 %
Peppercorn Plaza Parking Lot at Inglewood Center, Landover, MD (Davis et.al.)(2)	-	87%	-	67%	15%	43%	70%	64%
Prince George's County Department of Natural Resources (3)	-	81%	43%	-	-	-	99%	99%
Clayton and Schueler (40)	90%	65%	50%	-	80%	-	-	-
Federal Highway Administration (FHWA) (5)	75%	50%	50%	-	-	70% - 80%		
Virginia Stormwater Management Handbook (6)	-	50%-65%*	-	-	-	-	-	-

TSS: Total Suspended Solids, TP: Total Phosphorous, TN: Total Nitrogen, TKN: Total Kjeldahl Nitrogen, NO3, Nitrate, Cu: Copper, Pb: Lead, Zn: Zinc

*: 50% when the first 0.5" of the storm is detained, 65% when the first 1.0" of the storm is detained.

Actual monitored pollutant removal efficiency for Porous Pavers (Winer, 2000)

Polutant	Median Pollutant Removal (%)
Total Suspended Solid (TSS)	95
Total Phosphorous	70
Total Nitrogen	51
Heavy Metals (Zinc)	99

GREEN ROOF PRODUCT SPECIFICATIONS:

- 2.1 **MATERIALS:** Materials shall meet the following requirements.
- 2.2 **MEMBRANE:** Membrane shall be 100 % solids, hot, fluid-applied, rubberized asphalt membrane containing no PVCs and manufactured with an inert clay filler to impart acid resistance. Shall be Monolithic Membrane 6125EV by American Hydrotech, Inc or approved equal
- 2.3 **PRIMER:** A surface conditioner for concrete surfaces conforming to ASTM Specification D41 or Federal Specification SS-A-701.
- 2.4 **REINFORCING:** Spun-bonded polyester fabric reinforcing sheet. Shall be Flex Flash by American Hydrotech or approved equal.
- 2.5 **ADHESIVE:** Contact adhesive to bond elastomeric flashing together and to bond elastomeric flashing to a concrete substrate to be used in accordance with manufacturer's recommendations
- 2.6 **FLASHING:** 60-mil (1.5mm) thick, uncured neoprene sheet, Flex Flash UN; 157-mil (4mm) thick, torch-grade, modified asphalt, reinforced flashing membrane, Flex-Flash MB as manufactured by American Hydrotech.
- 2.7 **ROOF INSULATION:** Shall be an extruded polystyrene rigid board insulation. Shall comply with the physical requirements of ASTM C 578, Type VI or VII. Minimum compressive strength, ASTM D-1621, 40 or 60 psi. Shall be free of CFC's. The insulation shall have a nominal thickness of 1-inch. Shall be STYROFOAM brand as manufactured by the Dow Chemical Company.
- 2.8 **SEPARATION/ROOT BARRIER:** Shall be a combination of a fiberglass reinforced rubberized asphalt sheet and polyethylene root barrier. Hydroflex 30 / Root Stop WSF 40 as manufactured by American Hydrotech.
- 2.9 **DRAINAGE / WATER RETENTION:** Three dimensional, molded panels of recycled material with drainage channels top and bottom sides and water retention reservoirs top side. Shall be Floradrain FD25, as manufactured by American Hydrotech, Inc.

- 2.10 **METAL WORK:** All metal work shall be 0.032" aluminum. Aluminum coping shall be pre-finished metal, color to be selected by Owner.
- 2.11 **WATER RETENTION MAT:** Shall be non-woven, synthetic fiber mat capable of retaining additional moisture for potential use by vegetation. Shall be Moisture Retention Mat SSM 45 by American Hydrotech, Inc.
- 2.12 **WOOD NAILERS AND CANT STRIPS:** Shall be number 2 or better lumber, pressure treated for rot resistance and with waterborne preservatives for above ground use, complying with AWPS LP-2, and Kiln dry wood to a maximum moisture content of 15% after treatment.
- 2.13 **FILTER FABRIC:** Shall be Non-woven, polymeric, geotextile fabric as manufactured by American Hydrotech Inc.
- 2.14 **SOIL:** lightweight, engineered, green roof growing medium composed of appropriate mineral and organic materials to meet requirements of specified vegetation

Demonstrating Innovation

A Stormwater Retrofit at the Providence Supervisor's Office

Total Site Area (acres)	Impervious area proposed with development (acres)	Site soils hydrologic soils group	Total runoff from site [10 yr 2 hr volume, FT ³]	LID Total volume provided
1.2	0.96	B	10454	5254

	Area G Rain garden/ biofiltration	Area D Permeable Pavers	Area E Green roof
Depth ft	6	3	0.5
Ponding depth ft	0.75		
Surface area provided	1405	1527	240
Volume provided	3302	1832	120
Unit Cost \$\$/ft	\$20	\$12 50	\$49

		\$22,90	\$11,80
COST	\$28,100	0	0

TOTAL COST	\$62,80 0



DEPARTMENT OF PUBLIC WORKS
AND ENVIRONMENTAL SERVICES

Stormwater Planning Division

12000 Government Center Parkway, Suite 449
Fairfax, Virginia 22035
Phone 703-324-5500 Fax 703-802-5955

August 18, 2004

Sarah L. King, Grants Manager
Chesapeake Bay Watershed Office
DCR - Division of Soil and Water
203 Governor Street, Suite 206-G
Richmond, VA 23219-2094

Dear Ms. King:

Subject: Demonstrating Innovation: A Stormwater Retrofit at the Providence District Supervisor's Office 2004 Grant Application

This is to indicate that the Stormwater Planning Division of the Fairfax County Department of Public Works and Environmental Services supports the grant application for the 2004 Virginia DCR Chesapeake Bay Watershed Grant Low Impact Development and Innovative Urban BMP Projects. More specifically, it is for Demonstrating Innovation: A Stormwater Retrofit at the Providence District Supervisor's Office 2004 Grant Application. The plan calls for retrofitting the office complex with innovative low impact development techniques, more specifically:

- A grassed area in the parking lot will be converted into a rain garden/bio-retention area.
- A parking bay will be converted to a pervious paver system.
- An out building roof will be converted to a green roof.

These features form a smaller system and are part of a larger system to completely control all stormwater on the site. This is a highly visible area and is visited by many District residents and also houses a fire station. In addition, an environmental workshop is held on the site each spring. This provides an opportunity to demonstrate to citizens what can be done in their neighborhood and on their lot. We also plan to add this site to our monitoring program to support our stormwater monitoring efforts.

The practices will provide for a demonstrative stormwater management system on the site and will be useful as an educational amenity for the community and the County. The big benefit is for all the community to become aware of low impact development (LID) techniques.

We in Fairfax County are willing to work with the project partners to develop/review the plan so that all can be assured it will function as needed and intended. The recent study on "The Role of Regional Ponds in Fairfax County's Watershed Management" and supported by public comments indicates a strong emphasis on incorporating low impact concepts into stormwater management. There is also a strong public awareness for the need of less obtrusive stormwater facilities. Fairfax County is seeking ways and is encouraging their use in the County. What better way to demonstrate the use than at a County owned facility?

Sarah L. King, Grants Manager
Page 2

We hope you will look favorably upon this request.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Carl E. Bouchard". The signature is fluid and cursive, with a long horizontal stroke at the end.

Carl E. Bouchard
Director, SWPD

CEB/bl/grant application to DCR providence dist.

cc: Michael Aho, Administrative Aide, Providence District Supervisor's Office



FAIRFAX COUNTY

Department of Public Works &
Environmental Services
Facilities Management Division
12000 Government Center Parkway, Suite 424
Fairfax, Virginia 22035-0011

V I R G I N I A

Telephone: (703) 324-2886 Fax: (703) 324-

3954

August 20, 2004

Michael Aho
Providence District Supervisor's Office
8739 Lee Highway
Fairfax, VA 22031

Dear Mr. Aho:

The Facilities Management Division fully supports the ***Demonstrating Innovation: A Stormwater Retrofit at the Providence Supervisor's Office*** project. My office is involved in a number of green building initiatives at several County facilities. These projects include energy conservation measures, stormwater measures, and recycling efforts. One initiative we are interested in, but have not found a good retrofit opportunity is green roofs. Your project will provide an excellent opportunity to evaluate the performance of this type of system and to gain a better understanding of the longer term maintenance requirements. Incorporating the green roof system into the other stormwater elements as proposed in your project will also provide a great example of how to integrate a number of Low Impact Development elements into one stormwater system.

We look forward to participating with your office on this exciting project.

Sincerely:

James W. Patteson, Director
Facilities Management Division
Department of Public Works and Environmental Services



BOARD OF DIRECTORS
 Jean R. Packard, Chairman
 Sally B. Ormsby, Vice Chairman
 Gregory C. Evans, Secretary
 David L. Bulova, Treasurer
 Adria Bordas, Director-Extension

ADMINISTRATOR, Diane Hoffman

12055 Government Center Parkway, Suite 905 ♦ Fairfax, VA 22035-5512
 Telephone 703-324-1460 ♦ Fax 703-324-1421
 E-mail: conservationdistrict@fairfaxcounty.gov, Internet:
www.fairfaxcounty.gov/nvswcd

August 18, 2004

Michael C. Aho
 Providence District Supervisor's Office
 8739 Lee Highway
 Fairfax, VA 22030

Dear Mr. Aho:

The Northern Virginia Soil and Water Conservation District is pleased to support the grant proposal for *Demonstrating Innovation: A Stormwater Retrofit at the Providence Supervisor's Office*. This project will provide an excellent demonstration of a green roof, permeable pavers, and a rain garden, functioning as an integrated stormwater management system in a retrofitted parking lot at a highly visible location.

In the northern Virginia region, there is a growing awareness and interest in Low Impact Development concepts among the development community, local government agency staff, and the general public. Also, Fairfax County has demonstrated its commitment to promoting LID by amending the Policy Plan to encourage LID practices and by sending a 'Letter to Industry' that encourages the submission of site plans with LID practices and provides guidelines. LID practices play a key role in the Chesapeake Bay 2000 Potomac Tributary Strategy for reducing nutrient loadings in the urban environment. Yet, LID techniques are rarely incorporated in new development and redevelopment sites. Demonstrations are a proven method for encouraging greater acceptance, understanding and the use of innovative techniques. The parking lot retrofit at the Providence District office will play an important role in furthering the incorporation of LID practices in the area. It will demonstrate not only that these practices work, but that the local government accepts and encourages them.

We are confident that the considerable expertise within the project team will do an excellent job of analyzing, designing and installing a system of LID techniques that will successfully collect, detain, infiltrate and improve the quality of stormwater runoff from the site. The proposal includes a commitment to monitor the practices, which will provide an evaluation and documentation of their effectiveness. Also, the planned

outreach and education materials and events will significantly increase the value and impact of this demonstration project within all segments of the community.

We strongly endorse this proposal and enthusiastically look forward to participating in the project.

Sincerely,

A handwritten signature in cursive script, reading "Diane Hoffman".

Diane Hoffman

2004 VIRGINIA DCR CHESAPEAKE BAY WATERSHED GRANTS
Low Impact Development and Innovative Urban BMP Projects

Application Form

NOTE: For an electronic version of this form contact Sarah King, sarah.king@dcr.virginia.gov or 804-225-3785.

1. TITLE OF PROPOSED PROJECT

DEMONSTRATING INNOVATION: A STORMWATER RETROFIT AT THE PROVIDENCE SUPERVISOR'S OFFICE

2. APPLICANT

Name Supervisor Linda Q. Smyth (Fairfax County Board of Supervisors, Providence District Supervisor's Office)

Address 8739 Lee Highway

City, State, Zip Code Fairfax, VA 22031

Tax Status: Local government (e.g., local government, 501(c)(3) etc...) Tax ID#: 00-03018644

3. PROJECT CONTACT PERSONS

Project Contact/Officer: Michael Aho Financial Officer: TBD

Telephone: 703-560-6946 Telephone:

E-mail: michael.aho@fairfaxcounty.gov E-mail:

Fax: 703-207-3541 Fax:

Address: 8739 Lee Highway Address:

City, State, Zip Code: Fairfax, VA 22031 City, State, Zip Code:

4. LOCATION OF PROPOSED PROJECT

A. Jurisdiction (County or City): Fairfax County, VA

B. Chesapeake Bay River Basin: X Potomac, ☐ Shenandoah, ☐ York, ☐ Rappahannock, ☐ Lower Coastal Basins ☐ James, ☐ Eastern Shore

C. Hydrologic Unit Code(s): USGS Cataloging Unit: 02070010 DCR/NRCS-HU A15

5. FUNDING

A. Amount of grant funds requested: \$48,300

B. Amount of non-federal match funds: \$70,112.24

C. Source(s) of matching funds: In-kind services from DPWES, FMD, NVSWCD, BOS office; equipment from DPWES.

6. FUNDING PRIORITIES / CHESAPEAKE 2000 BAY AGREEMENT

Does the project support funding priorities commitments in the Development, Redevelopment and Revitalization section (4.2) of the Chesapeake 2000?

X Yes Which specific commitments under 4.2 will be supported through this project? 4.2.2, 4.2.7, 4.2.8, 4.2.10, 4.2.13

On the lines below, provide several sentences describing how the project supports specific objectives in the *Chesapeake 2000 Bay Agreement*. Include not only the support for 4.2 but to other Chesapeake 2000 commitments such as those under Watersheds (2.2), Land Conservation (4.1), and Community Engagement (5.2).

The project will support Section 4.2.13 of the Chesapeake Bay 2000 Agreement by designing a conceptual LID/BMP modification plan for the site and installing three such devices. The project will involve not only the grantees, but serve as an example of how to retrofit re-development sites in the area with LID BMPs. The project supports Section 4.2.2 by developing informational materials that will be provided to the public and County staff. The educational materials will highlight practices that can be retrofitted and will showcase retrofitting opportunities that result in reduced pollutant loadings to nearby watercourses. The project supports Section 4.2.7 since it will involve modifying current site plans to support LID, better site design and sustainable design elements – both now and in the future. The project supports 4.2.8 since it will be available for developers and land use planners to visit and the informational materials will be provided to them. The project supports 4.2.10 since it will involve a quantitative evaluation or pre- and post-LID nutrient discharges and an evaluation of changed hydrologic characteristics of the area. The project also supports 2.2.3 since the project will serve as a model and pilot project for retrofitting stormwater practices in the Fairfax County area. Through engagement efforts, the project also supports 5.2.5, 5.2.6 and as a County entity, supports Section 5.3.1.

7. ABSTRACT

Please provide a 2-3 sentence project abstract

This highly visible demonstration project will encompass three innovative LID/BMP techniques: a rain garden/bioretenion area, a green roof and installation of permeable pavers.; installation of these will reduce impervious cover on the site and improve not only water quality, but also reduce water quantity. The rain garden will be the first in Fairfax County to serve as a detention rain garden. Various educational materials, public outreach efforts, and monitoring processes will be completed as part of this project.

8. APPLICATION SUBMITTAL

Six hard copies and one electronic version (Microsoft Word files are preferred, Adobe Acrobat Reader <pdf> files are also accepted) of all applications must be received at DCR by 5 PM on Friday, August 20, 2004. Please do NOT submit applications in spiral binding, nor plastic/hard covers. Direct proposals and questions to Chesapeake Bay Grant Manager, Sarah King.

Attn: Sarah L. King, Grant Manager
Department of Conservation and Recreation
Division of Soil and Water Conservation
203 Governor Street, Suite 206-G
Richmond, Virginia 23219-2094

sarah.king@dcr.virginia.gov
PH: (804) 225-3785
FX: (804) 786-1798

COMMONWEALTH OF VIRGINIA
Department of Conservation and Recreation
Chesapeake Bay Watershed Office

Project Financial Report Form
 2004 Chesapeake Bay Implementation Grant
 BAY-2004-##-SR

NOTE: For an electronic copy of this form contact Sarah King, sarah.king@dcr.virginia.gov or 804-225-3785.

Federal ID#:	00-03018644	Invoice Payable to:	TBD
Grantee:	Providence District Supervisor's Office	Phone #:	703-560-6946
Contact Person:	Michael Aho		
Mailing Address:	8739 Lee Highway Fairfax, VA 22031		
Project Title:	Demonstrating Innovation: A Stormwater Retrofit at the Providence Supervisor's Office		
Reporting Period:	TBD		
	(beginning date)	(end date)	

DCR FUNDS	Project Budget	Current Expenditures	Cumulative Expenditures	Unexpended Project Budget
Personnel	\$			
Fringe	\$			
Travel	\$			
Equipment	\$ 8,000.00			
Supplies	\$ 23,600.00			
Contractual	\$ 1,600.00			
Construction	\$ 15,100.00			
Other Direct	\$			
TOTAL	\$ 48,300.00			

These last three columns are to be completed with quarterly reports, after project is awarded funding.

Total Reimbursement Request: _____

Authorized Signature: _____

Date: _____

MATCH FUNDS	Project Match Budget	Current Match Expenditures	Cumulative Match Expenditures	Unexpended Match Budget
Personnel	\$ 27,090.00			
Fringe	\$ 4,551.12			
Travel	\$ 750.00			
Equipment	\$ 5,934.00			
Supplies	\$ 9,500.00			
Contractual	\$			
Construction	\$ 6,300.00			
Other Direct	\$ 600.00			
Indirect	\$ 15,387.12			
TOTAL	\$ 70,112.24			

These last three columns are to be completed with quarterly reports, after project is awarded funding.

2004 VIRGINIA DCR CHESAPEAKE BAY WATERSHED GRANTS
Low Impact Development and Innovative Urban BMP Projects

Milestone Table

Name of Project: Demonstrating Innovation: A Stormwater Retrofit at the
 Providence Supervisor's Office

Sponsor: Providence District Supervisor's Office

NOTE: For an electronic copy of this form contact Sarah King, sarah.king@dcr.virginia.gov or 804-225-3785.

Milestone	Responsible Party	Target Completion Date	Progress / Status (To be completed for funded projects.)
Submit quarterly budget and project narrative reports, and required forms to DCR.	BOS office	1/14/05 4/15/05 7/15/05 10/14/05	
Design/survey	DPWES/NVSWCD	Within 30 days of grant award	
Infiltration studies	NVSWCD and partners	Concurrent with design/survey phase	
County review/permits	DPWES/County	Within 60 days of design completion	
Develop draft web site and brochure to discuss project status	BOS office	Concurrent with County review	
Contracts/advertising	Responsible County agencies	Within 90 days of review completion and permit acquisition	
Commence construction	DPWES/NVSWCD/ Green Roof contractor	Within 60 days of awarding of contract(s)	
Finalize brochure for distribution / distribute brochure	BOS office	Upon completion of the projects	
Update website with pictures, information, links, etc.	BOS office	Ongoing throughout project	
Draft strategy for implementation at the Environmental Workshop	BOS office	Upon completion of the projects	